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Morphological features and organ distribution of schistosomal infection

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Summary

A total of 74 histologically diagnosed cases of schistosomiasis involving various organs and tissues were reported in the Department of Pathology of the University of Ilorin Teaching Hospital, Ilorin between January 1979 and December 1997. While some of the cases were incidental discoveries, others were the primary causes of patients' clinical problems such as infertility. The ages of patients in this study were relatively higher than the usual childhood or adolescence wherein schistosomiasis is commonest and this is thought to be due to the longer duration required for morphological changes to be established in tissues. A case of urinary bladder schistosomiasis with squamous cell carcinoma was found in a 55-year old man and this lends support to the claim that schistosomiasis of the urinary bladder may predispose to cancer in the organ. Findings in this study underscore the need for high index of suspicion in endemic areas wherein histological examination of appropriate tissue may be all that is needed in what otherwise appears to be a diagnostic enigma.

Keywords: *Morphological, infection, schistosomal insentility*

Résumé

Un total de 74cas de schistosome histolorequement diagnostique dans les differents olgans et tissues ont été reportés dans le Departement de Pathology du Centre Hospitalier Universitairie d'Ilorin a'Ilorin de Janvier 1979 a' Decembre 1997. Pendant que certain cas avaient été decouvert accidenlellement, d'autre étaitent des causes primairies de probleme cliniques a savoir l'infertilite. L'age des patients de cette etude était relativement pous avancé que les cas habituel de enfant et d'adolescent que les schistosomes affectent le plus et ceci est peilt etre due a' la congue durée requise pour ces changements mophologiques dans les tissues. Un cas de schistosome de vessie avec les carcinomas a été decouvert chez un patient de 55 ans et ceci a about a' hencherur le poit que les schistosomes de vessie predispose le'organ au cancer.

Les resultats de cette etude devalu le besoin d'index de supcon dans les regions endemiques, mois les examens histologeques des tissues appropriers pourrait etre tout ce quil faut pour arriver a'un diagnostique précis.

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Introduction

Globally, schistosomes are said to infect 1 in 30 people [1]. Man is the definitive host of several species of schistosomes which reproduce sexually in venous blood stream. This chronic infestation is endemic in tropical and subtropical regions wherever the parasites' specific snail intermediate hosts are found and it produces morphological changes in various organs with resultant clinical symptoms and signs. Various studies [2-4] have documented high helminthic infestation rate among rural populations in Nigeria. In some of such localities, terminal haematuria (consequent upon urinary schistosomiasis) is interpreted by natives as a sign of attainment of manhood or maturity. .

While the adult parasites adapt well and cause few changes in the host, the eggs elicit hypersensitivity granulomas with devastating clinical consequences depending on the organ affected. Some of the factors that determine the severity and types of lesions are the species of schistosomes and intensity of infection. The acute form, otherwise termed Katayama syndrome, is characterized by fever, diarrhoea, toxaemia, eosinophilia and hepatosplenomegaly. Some of the long-term complications include "pipe-stem fibrosis" of the portal tract, infertility, carcinoma of the urinary bladder and obstructive uropathy which could terminate in renal failure in untreated cases. This study was undertaken to establish the pattern of organ involvement and the morphological features of schistosomal infection as reported in the Department of Pathology of University of Ilorin Teaching Hospital, Ilorin, Nigeria.

Materials and methods

Materials for this study consisted of all cases of schistosomiasis diagnosed histologically from surgical specimens received in the Department of Pathology of University of Ilorin Teaching Hospital between January 1979 and December 1997. The clinical information and histopathology records were obtained from request forms and histopathology register.

All the diagnoses were histologically confirmed from paraffin embedded sections stained with haematoxylin and eosin. Only the cases in which schistosome ova and/or worms were found were included in this study and some of them were used for photomicrography to demonstrate specific morphological features.

Results

Schistosome ova and/or worms were found histologically in 74 of the surgical specimens processed in the Department of Pathology of University of Ilorin Teaching Hospital between January 1979 and December 1997. The frequency of organs involved are shown in Table 1 with intestinal/omental involvement constituting over 70% of the cases.

Table 1: Organ distribution of schistosomal infection

Organ	Number of	%
Intestine/omentum		
Appendix	40	54.1
Intestine	6	8.1
Omentum	6	8.1
Female genital tract		
Cervix	6	8.1
Fallopian Tube	5	6.8
Male genital tract		
Testis	4	5.4
Prostate	1	1.4
Urinary tract		
Bladder	3	4.0
Hepatobilliary system		
Liver	3	4.0
Total	**74**	**100.0%**

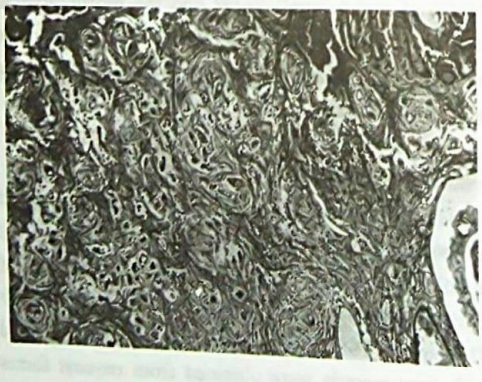

Fig. 1: Schistosomal appendicitis. Adult schistosome in a dilated vein in the lower right hand corner. Note numerous granulomas with calcified ova (H & E x 50)

The appendix (Fig. 1) was the singular most involved organ accounting for about 54% of all cases. A case of urinary bladder schistosomiasis with squamous cell carcinoma (Fig. 2) was found in a 55-year old man. The female genital tract accounted for 14.9% of the cases and these affected the cervix and fallopian tube (Fig. 3). Some of the patients whose fallopian tubes were affected, presented clinically with infertility or tumorous adnexal lesions. The male genital tract accounted for 6.8% of the cases and these affected the testis and prostate (Fig. 4).

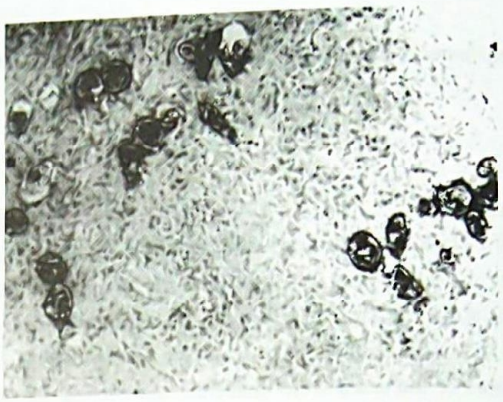

Fig. 2: Squamous cell carcinoma of the urinary bladder secondary to schistosomal infection. Groups of calcified ova are deposited within sheets of malignant cells (H & E x 130)

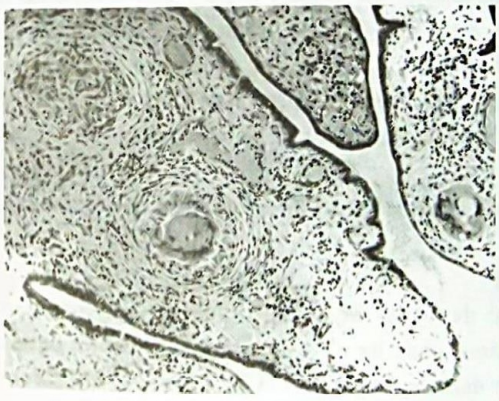

Fig. 3: Schistosomal salpingitis. Ova and granulomas are present within mucosa of the fallopian tube (H & E x 130)

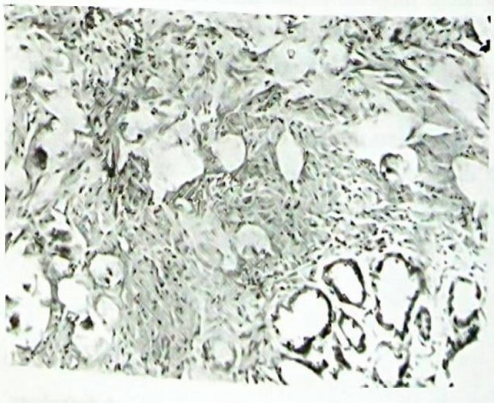

Figure 4: Schistosomal prostatitis. Section shows schistosomal ova some of which are calcified (H & E x 130).

The disease predominantly affected adolescents and young adults as about two-third of cases occurred in patients below 40 years (Table 2). The average age at presentation was 30.3 years (range 5 - 65 years). There was a male preponderance with over 68% of cases occurring in males (Table 2).

Table 2: Age and sex distribution of schistosomal infection.

Age (in years)	Sex		Total	%
	Male	Female		
0 - 9	3	0	3	4.1
10 - 19	9	1	10	13.5
20 - 29	11	7	18	24.3
30 - 39	10	8	18	24.3
40 - 49	5	3	8	10.8
50 - 59	5	2	7	9.5
60 - 69	1	1	2	2.7
70 - 79				
Age unspecified	7	1	8	10.8
Total	51	23	74	100.0
%	68.9	31.1	100%	

Discussion

Schistosomiasis is a curable parasitic infestation that, if left untreated, can persist for 30 years or more [7]. The adult worms lodge in the blood vessels in various organs and do not excite any appreciable reaction in such vessels. Ova that are deposited in tissues elicit hypersensitivity granulomas that form scars or tumorous masses the consequences of which, to a large extent, depend on the organ or tissue involved.

The pathological changes that result from schistosomal infection have been classified into four stages (W.H.O. Scientific Group on Research in Bilharziasis 1967) [8]:

1. The stage of cercarial invasion, characterized by papular dermatitis and inflammatory reaction in the lung and liver;
2. The stage of maturation, characterized by hyperergic reactions, both generalised and local, to the products of eggs and/or young schistosomes;
3. The stage of established infection, characterized by local inflammatory reaction to ova, resulting mainly in granuloma formation, fibrosis not being a dominant feature;
4. The stage of late infection, characterized by progressive formation of fibrous tissue and its complications, according to the organ involved.

The present study is based on morphological features and therefore deals with stages 3 and 4. This accounts for the older ages of patients in this study as time is required for the morphological features to be established in the organs. This clarification is pertinent since high prevalence of the first two stages have been amply documented in childhood and adolescents [2-4] and are usually diagnosed by urine or stool microscopy.

Over 70% of the cases recorded affected the intestine and omentum with the appendix involved in 54.1% of cases. Such high intestinal involvement was also reported by Malik *et al.* [8] in the Sudan although the reason for this high density is not clear at present.

In the female genital tract, lesions were seen only in the cervix and the fallopian tubes and in two of the cases involving the latter, patients presented with infertility. Involvement of fallopian tubes have been reported in endemic areas [8] and may predispose to infertility and ectopic pregnancy. Ekoukou *et al.* [9] reported on two African women with *Schistosoma haematobium* localized in the peritoneum and fallopian tubes. The first patient had primary infertility associated with bilateral hydrosalpinx and peritoneal inflammation while the second patient had ectopic pregnancy associated with chronic salpingitis. Okonofua *et al.* [10] also reported on ectopic pregnancy associated with tubal schistosomiasis. Furthermore female genital schistosomiasis is now considered as a risk factor for transmission of Human Immunodeficiency Virus (HIV) [11]. Pathophysiological, immunological and epidemiological evidences have been established for an association between genital ulcer disease due to *S. haematobium* and HIV infection in women [11]. Consequently female genital schistosomiasis is considered as an example of how an interaction between a parasitic disease and HIV facilitates the propagation of the latter.

The 3 cases of hepatic schistosomiasis found in this study is relatively low compared with the 25 recorded by Malik *et al.* [8]. The main consequences are perisinusoidal portal hypertension, hepatosplenomegaly and oesophageal varices which could result in haematemesis and melaena secondary to variceal and gastrointestinal bleeding. It is important to remark that the hepatic parenchyma usually show no evidence of significant damage which explains the absence of hepatic failure in such instances. Malik *et al.* [8] found low frequency of established cirrhosis and this is in keeping with the consensus of opinions which discounts schistosomiasis as an aetiological agent in hepatic cirrhosis. It is important to bear this in mind in endemic areas since in many of such localities aetiological agents and/or factors of cirrhosis such as malnutrition, alcoholism, aflatoxins, hepatitis B and C viruses, etc., are prevalent [12].

It is generally accepted that schistosomiasis, if not causative, is at least associated with malignancy [7]. Carcinoma of the urinary bladder is the most common malignancy in some tropical and subtropical countries and in some localities such prevalence is thought to be due to endemic schistosomal infection [13,14]. Only one case of squamous cell carcinoma associated with schistosomiasis of the bladder was found in this study. Malik *et al.* [8] in the Sudan found carcinoma of the bladder in 15 out of 52 cases of urinary bladder schistosomiasis and 13 of them were of the squamous cell type. Considered along with the report of Hashem [15] from Egypt, all these findings lend credence to the claim that schistosomiasis of the urinary bladder may predispose to cancer in the organ and is predominantly of the squamous cell type. This is thought to be due to the squamous metaplasia resulting from the parasitic lesion.

Schistosomiasis-associated bladder cancer defines a characteristic pathology, cellular and molecular biology that differs from urothelial carcinoma of non-schistosomal origin [13-14]. N-Nitroso compounds are suspected aetiological agents in the process of bladder cancer induction during schistosomiasis. Elevated levels of DNA alkylation damage have been detected in schistosome-infected bladders and are accompanied by an inefficient capacity of DNA repair mechanisms [16,17].

This study no doubt underscores the importance of histological examination of biopsy specimens in a wide variety of diseases in which such investigation was never hitherto contemplated. Cases abound wherein repeated

examination of stools and urine for ova proved negative for schistosome and it was only at histology that the exact nature of the lesion was ascertained. As such, as pointed out by El Tayeb [18], resort to frozen sections or biopsy in endemic areas could obviate unnecessary operations.

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